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THE VARIATIONS OF GLACIERS. VI.[1]

THE following is a summary of the Fifth Annual Report of the International Committee on Glaciers:[2]

RECORD OF GLACIERS FOR 1899

Swiss Alps.—As we approach the end of the century the advance of a number of glaciers which began in 1875 has gradually died out. Only one glacier was known to be advancing in 1899; nine were doubtful, and fifty-five were certainly or probably retreating.[3]

Eastern Alps.—During 1899 Drs. Blumcke and Hess published an important paper on the Hintereis glacier containing observations of the movement, melting, and interior temperature of the glacier, and an excellent map.[4] During the time of observation, in the summer, the temperature to a depth of forty meters was found to be practically the melting temperature.

The Vernagt glacier continues to advance; during the last year its velocity at a certain point has increased from 178^m per year to 280. Since it has been under observation (1889–1899) its velocity has increased to fifteen times its original value. The ice has thickened and the glacier is advancing.[5]

Of the glaciers observed in the Eastern Alps, fifteen are advancing, thirteen are stationary, and more than twenty-two are retreating.[1]

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[1] The earlier reports appeared in this JOURNAL, Vol. III, pp. 278–288; Vol. V, pp. 378–383; Vol. VI, pp. 473–476; Vol. VII, pp. 217–225, and Vol. VIII, pp. 154–159.

[2] Archives des Sciences Phys. et Nat., Vol. X, pp. 1–20. Geneva 1900.

[3] Report of PROFESSOR FOREL.

[4] Untersuchungen am Hintereisferner. Wissensch. Ergans. z. Zeit. des D. u. O. Alpenvereins. 1. Bd. 2. Heft.

[5] A very complete account of this glacier was given by PROFESSOR S. FINSTERWALDER in the Wissensch. Erganzunghefte zur Zeits. des D. u. O. A–V. 1. Band, 1. Heft, Graz 1897. This important paper contains a history of the remarkable variations the glacier has suffered, and an excellent discussion of the nature of the movement of the ice and the origin of moraines.

Italian Alps.—Eight glaciers show a retreat and two an advance.[2]

French Alps.—The Société des Touristes du Dauphiné has recently published an important book on the glaciers of Dauphiné.[3] The conclusions are as follows :

As a rule the glaciers of this region have been in retreat during the second half of the nineteenth century, but some became stationary and a few even advanced between 1889 and 1893. Of the glaciers under observation twenty-four are in retreat and two are stationary. One of these, the glacier Blanc, is remarkable; it advanced before 1865, was in retreat from 1865 to 1886, and then began an advance which has continued until 1899; during this period the glaciers nearby were in retreat, though a few of them showed an advance for a short time. Three glaciers at present show a thickening which may result in an advance.

Swedish Alps.—The Mika glacier has been stationary since 1897. Observations have shown a velocity of 18.3^{cm} a day in summer, whereas the mean for the year is 7.6^{cm}.[4]

Norwegian Alps.—A number of glaciers have been under observation and show in general a very slight retreat. The western glaciers of Jotunheim advanced during the summer of 1898. During the last few years a small snowfall and much heat is reported for this region and these glaciers are again in retreat.[5]

Greenland.—Photographs of the small Kiagtut glacier, near Julianehaab, show a retreat of several hundred meters between 1876 and 1899. A small glacier on the island of Disko retreated 46^{m} between 1890 and 1891.[6]

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[1] Report of PROFESSOR FINSTERWALDER. [2] Report of Mr. OLINTO MARINELLI.

[3] Observations sur les Variations des Glaciers et l'Enneigement dans les Alpes dauphinoises; edited by Professor W. Kilian. Grenoble, 1900.

[4] Report of DR. SVENONIUS.

[5] Report of DR. OYEN. [6] Report of DR. STEENSTRUP.

Canada.—The Victoria glacier, near Lake Louise, Alberta, is retreating though no measures have been made.

Photographs of the Asulkan glacier, British Columbia, show no changes between 1898 and 1899. A small glacier on the southern side of Mt. Sir Donald has become smaller.

The Illecellewaet glacier has been observed with more or less regularity since 1887, during this time it has apparently retreated on the average 15.8^{m} a year. There are indications that it was stationary or advancing before 1887. It retreated 4.9^{m} between 1898 and 1899. In August 1899 the velocity of the ice close to the end was 13.7^{cm} a day; 460^{m} further back and near the middle of the breadth it was 17.2^{cm}. The upper part of the glacier seems to be growing thicker.[1]

Russian Asia.—The report gives the locations of a number of glaciers, many of which show undoubted signs of retreat.[2]

Himalaya.—Mr. Freshfield has induced the government officials to undertake regular observations of some glaciers. He found the glaciers of Kindjinjanga advancing slightly after having suffered an insignificant retreat. In general there are no indications of any important changes among those glaciers in recent years.

REPORT ON THE GLACIERS OF THE UNITED STATES FOR 1900[3]

The small glaciers in Montana continue to retreat.

A small glacier has been discovered on Mt. Arapahoe in

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[1] Report of MESSRS. G. and W. S. VAUX, JR. See papers by the same authors: Some observations on the Illecellewaet and Asulkan Glaciers of British Columbia. Proc. Phil. Acad. of Nat. Sci., 1899, pp. 121–124.

Additional Observations on Glaciers of British Columbia. Proc. Phil. Acad. Nat. Sci., 1899, pp. 501–511.

The Glacier of the Illecellewaet. Appalachia, 1900, Vol. IX, pp. 156–165.

ALBRECHT PENCK, translated by D. R. Keys: The Illecellewaet Glacier in the Selkirks. Proc. Canadian Inst. 1900, pp. 57–60.

[2] Report of MR. MOUSCHETOFF.

[3] A synopsis of this report will appear in the Sixth Annual Report of the International Committee. The report on the glaciers of the United States for 1899 was given in this JOURNAL, Vol. VIII, pp. 154–159.

Colorado.[1] The only other glacier known in this state is the Hallett.[2]

The Eliot glacier on Mt. Hood, Washington, is retreating and growing thinner (*H. D. Langille*). This means that the retreat will probably continue for some years and at an increasing rate.

On September 3, 1899, an earthquake shook the Alaskan coast and caused a large quantity of ice to be broken from the ends of tide-water glaciers. Glacier bay was so full of ice during the summer of 1900 that the steamers which usually visit that region were unable to approach Muir glacier nearer than four or five miles, and no satisfactory estimates could be made of the retreat of the glacier.

The Windom glacier, which ends on gravel-deposits in Taku inlet, is reported to have suffered the loss of a large part of its end, due apparently to the washing out of the supporting gravels.

Miles glacier, near the Copper River, Alaska, shows a marked recession since last year (*A. C. Spencer*).

The United States Geological Survey has published a large volume on " Explorations in Alaska in 1898.[3] Several parties were sent to explore various routes from the coast to the interior and, although no especial attention was given to the study of the glaciers, sufficient observations were made to bring out some interesting facts; many glaciers are cursorily described and their locations shown on the maps. The Alaskan glaciers are all of the valley or Piedmont types; Alaska was never under a great ice sheet like the eastern part of North America. The glaciers in the mountainous regions to the north, east, and southeast of Cook's Inlet, many of which are very large, were formerly much more extensive than now, and show evidences of continued retreat. Whereas the glaciers to the west and southwest of Cook's Inlet are small and, though retreating, they were never much larger than at present (*Spurr*, *Mendenhall*, *Eldridge*).

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[1] The Glacier of Mt. Arapahoe, Colorado, WILLIS T. LEE: This JOURNAL, Vol. VIII, pp. 647–654.

[2] F. H. CHAPIN: Appalachia, Vol. V. p. 1; and Mountaineering in Colorado, p. 97.

[3] Twentieth Ann. Rept. U. S. Geol. Surv., Part VII. See also ABERCROMBIE: The Copper River Exploring Exped. Washington, 1899.

Professor I. C. Russell has published an account of the former and present glaciation in northern Washington.[1] A synopsis of the existing glaciers in this region was given in an earlier report of this series.[2]

HARRY FIELDING REID.

GEOLOGICAL LABORATORY,
JOHNS HOPKINS UNIVERSITY,
March 15, 1901.

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[1] I. C. RUSSELL: A Preliminary Paper on the Geology of the Cascade Mountains in Northern Washington. Twentieth Ann. Rept. U. S. Geol. Surv., Part II.

[2] This JOURNAL, Vol. IV, pp. 222–224.